DOCUMENT RESUME

ED 265 870 IR 051 410

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TITLE Developing a Management Information System.
PUB DATE May 85
NOTE 15p.; Paper presented at the Annual Meeting of the Association for Institutional Research (Portland, OR, April 28-May 1, 1985).
PUB TYPE Viewpoints (120) -- Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Databases; *Decision Making; *Educational Planning; *Higher Education; Information Needs; *Information Systems; Long Range Planning; *Management Information Systems; Position Papers; Program Descriptions; Systems Development
IDENTIFIERS *Strategic Planning; *Trinity University TX

ABSTRACT

This paper is based on the assumption that in shaping academic strategies for long-range planning purposes, educational institutions must be able to gather adequate information on which to base administrative decisions. Information on how the institution has operated in the past as well as how it is currently operating are critical items for valid strategic planning; such information is crucial for internal operations. A management information system (MIS) is defined as a system that permits a user to retrieve, arrange, and display data maintained in the files. Negative characteristics of currently advertised MIS products are: they are expensive to purchase; expensive to install; often require the purchase of additional hardware; and, in addition, it takes time to install the systems, organize and input the database, and train people to use the systems. The essential capabilities in a simple local MIS system--the ability to retrieve, aggregate, and display data--are discussed. A case study of the systems development activities of a director of institutional research at a small private institution in Texas (Trinity University) describes the in-house development of an MIS that brings together and provides access to separately maintained information systems that had been implemented at Trinity at different times and for different purposes. (THC)

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Developing a Management Information System

Michael Yost

For any college or university that hopes to survive in the difficult years which lie ahead, there appears to be one overriding answer. The answer that the more alert and forward-looking institutions are beginning to give is to strengthen management and to shape their own academic strategies. Each institution needs to assess its place in the "educational marketplace" and to decide, with some degree of specificity, where it wants to position itself relative to the institutions with which it chooses to compete. Basically, this competition is a competition for students, faculty, and funds. Before an institution begins to shape an academic strategy for itself, it should be well managed. Also, it needs to be certain that it has adequate information on which to base administrative decisions. No athletic team, business, military unit, or university can hope to succeed without adequate data on which to base its decisions. Well-administered universities are those which are efficient campuses, where limited funds are spent with maximum effect and in a manner which permits them to acquire a stronger position in the competitive market. As colleges and universities shape an academic strategy, they

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need to gather the information on which to base that strategy. Information about how the institution has operated in the past and how it is presently operating is one of the critical items for valid strategic planning.

Clearly, information about campus internal operations is crucial. Information on space and facilities utilization, equipment use, library, bookstores and student center utilization is very important. Information about costs and dollar flow is of equal importance. Curricular and program information, information about faculty and their professional and teaching activities are also important. Alexander Astin of UCLA, a leading proponent of the use of data in decision-making, made a case for the use of data in decision-making when he stated:

> "A high-quality institution is one that knows about its students.... Further, the high-quality institution has a method for gathering and disseminating this information, enabling it to make appropriate adjustments in programs or policies when the student data indicate that change or improvement is needed. In other words, quality is equated here not with physical facilities or faculty credentials but rather with a continuing process of crucial self-examination that focuses on the institution's contribution to the student's intellectual and personal development."

To gather data which is useful in decision-making and strategy shaping, one must go to many different places on a campus. Some data reside in different office systems on

campus and are carefully maintained. Examples of well-maintained data are those which are maintained in the registrar's office, admissions office, student financial aid office, alumni office, academic affairs office, payroll office, development office, placement office, housing office, and comptroller's office. Other data which must be gathered are not the specific domain of any one office and, therefore, become the responsibility of the office of institutional research. These data are difficult to gather and sometimes lack reliability.

Professional journals and trade magazines contain varied descriptions of Management Information Systems (MIS) which are currently being used by institutions. Some of these systems are sold as ostensibly holding "all" of the management information that an institution could conceivably use, while others are being sold as being small, but efficient. Typically, these systems are described as being "user friendly", "easy-to-use", "flexible", "fast", and "powerful".

An MIS is simply a system which permits a user to retrieve, arrange, and display the data which are maintained in the files. The primary function of most MIS's is to retrieve and display selected data elements. The secondary function of most MIS's is to permit the user to

not only retrieve selected data, but also to be able to aggregate the data prior to the time that it is displayed or printed. The advantages of using an MIS are the speed with which it can retrieve and/or aggregate data and the ease with which a user can obtain the information that he needs.

There are several characteristics which most of the currently advertised MIS products have in common. First and foremost, these systems are expensive to purchase, expensive to install, and often require the purchase of additional hardware. Second, the systems take time to install, time to organize and input the database, and time to train the people to use them. The implementation of an MIS at an institution is simply not an inexpensive venture that can be done very quickly with limited human resources. Even after an MIS is installed, it must be maintained and updated, which requires an expense in the form of dollars for hardware and personnel. Once an institution embarks on the venture of installing and using an MIS, it has essentially bought into a commitment which is very difficult to abandon. Most of the effort expended and the dollars input to the development of an MIS are lost when an institution chooses to abandon its use.

There are very few institutions which do not maintain at least some of their institutional data files in a computer, and some institutions maintain almost all of their data files in a computer. In today's world, it is virtually impossible for an institution to survive without the use of computers and some types of computerized institutional data files. For each of the data files which already exist, systems for building and maintaining the data have already been developed and implemented and this can serve as the foundation of an institution's MIS. This means that a great deal of the thinking, preparation, and work needed to generate all or a part of an MIS has already been done, and the process of building a simple MIS system for an institution is relatively straightforward. All that is required to have a locally developed MIS is to develop a method by which the data can be retrieved, aggregated, and displayed. In situations where there are multiple independent data files, there is one additional problem which often must be solved. This is the problem of merging and/or concatenating two or more files where an administrator needs to be able to examine the data in two or more of the files simultaneously. This requires the assistance of an experienced programmer. However, this is not an insurmountable task and it is one that an experienced programmer can solve in a reasonable amount of time.

Institutions which have existing computerized data files have systems and procedures which are used to input and maintain the data in the files. In addition, existing systems usually have programs which can be used to generate standard reports or output. This is a substantial foundation on which to build an MIS. To have a complete MIS, a user must have the ability to retrieve selected data from the files and, on occasion, to aggregate and/or display it in a variety of formats. Commercially available MIS's give the user these capabilities in a single, integrated package. There are, however, a number of "off-the-shelf" program packages that were not originally developed to be an MIS which will serve very well as the basis for a locally developed MIS. Among others, there are Easytrieve, Report Generator, Statistical Analysis Systems (SAS), and Statistical Package for the Social Sciences (SPSS). These products and others can be employed by users as very powerful tools to retrieve and to aggregate data. These products do not require a great deal of training to use once the system is learned, and they are easily maintained by a computer center.

Two years ago, I accepted the position as director of institutional research at Trinity University. Trinity University is a small (3000 students) private institution.

In the last four years, the goals and mission of Trinity have been examined and restated and a strategy for its future growth and development has been developed and articulated. The Board of Trustees and the administration strongly believe that we must carefully monitor the growth and development of the institution as we continue to follow through on our strategy. Early in the development of the goals, and mission at Trinity, it was decided that an MIS was required. My predecessor had not developed an MIS, and lack of funds, time, and personnel kept me from developing such a system when I initially accepted the position.

At Trinity, there are four separately maintained computer systems which contain data files that can serve as the foundation of an MIS. These four systems are: a payroll/personnel system (P/P), a financial accounting system (FAS), an alumni/development systems (A/D), and an integrated student information system (ISIS).

The P/P system is an old one (more than 10 years old) which is maintained through card input and has no on-line features. This system is made up of two files. The system contains all of the payroll information and the personal and demographic data for all employees. There are a series of standard reports which can be obtained

from this system, but they are not flexible and do not permit the user to make ad hoc inquiries into the system. The FAS is somewhat newer than the P/P system and is made up of four major files and a number of subfiles. This system contains the data for almost all of the financial activities of the institution. This system has several programs which can be used to produce standard reports. Very little flexibility is built into the programs which produce the reports. Neither the P/P system nor the FAS have on-line capabilities built into them, which means that the only way that information can be obtained from the systems is by requesting printed output.

The ISIS is a relatively recent implementation and is a very large, complex system. This system contains all of the faculty, student, and course data used by the admissions office, financial aid office, housing office, registrar's office, and business office. The system contains longitudinal data on currently enrolled and recently graduated graduate and undergraduate students. We also maintain in the system all of the records of persons making application for admission and of persons who make inquiries for prospective admission. This system contains 54 files and is managed by TOTAL. The A/D system is our newest system. This system contains all alumni records, and pledges and

gifts to the institution, as well as an accounting system for gifts which are given to the institution. The gift data which are entered into this system are also entered into FAS. The A/D system contains 16 files. Both the ISIS and A/D systems have on-line input of data and data can be retrieved and displayed on terminals. However, the systems do not permit a user to make on-line, ad hoc requests for data. Both of the systems have extensive report generation capabilities built into them. Although the report generation programs have some flexibility built into them, they are still somewhat restrictive in terms of which data elements can be accessed and how they are aggregated and/or displayed.

When I assumed the position as director of institutional research, I was confronted with a situation where there were a great deal of data available but only selected pieces of data could be accessed, and then, only presented in a standard format. These constraints placed limitations on my ability to monitor the progress of the institution. The institution had already embarked on its new developmental strategy and I had some catching-up to do. Almost all of the data that I needed already existed in our computer files, and all that I had to do was to develop a method by which it could be accessed. After reviewing the options available to me, I

decided to use the Easytrieve and SPSS program packages to access the data in the four systems. Both of these program packages are powerful and flexible and permit the easy retrieval, aggregation, and listing of data. Both program packages can be used to access the data directly from the disk files on the P/P, FAS, and D/P systems. Because of the structure of the files and the use of TOTAL to manage our ISIS files, the two program packages could not be used to access these data directly. As a result, we developed a series of three programs which extract selected data elements from ISIS which can then be accessed by SPSS and Easytrieve. The first program extracts data on prospective students and/or persons who made application for admission (Prospect/ Applicant Extract). The second program extracts data on graduate and/or undergraduate students who are enrolled (Enrolled Student Extract). The third program extracts data for all of the courses taught in a semester (Course/ Faculty Load Extract).

Since the ISIS and A/D systems are on-line, the data in them are updated on a daily basis. The files in the P/P and FAS systems are updated on a scheduled weekly or monthly basis. As a result of the frequent updating of the data in the four systems, the data which are accessed through the use of Easytrieve and SPSS are very current

and permit us to have an up-to-date knowledge of what is taking place within our institution. The extract programs which were developed to be used with ISIS give us an additional research strength. These programs permit us to go back in time and reconstruct our database for any semester in the last three years. Because the extract programs are flexible, we can reconstruct the enrollment, class schedules, faculty loads, etc. for any previous semester. This capability truly enhances our system-monitoring capabilities.

All of the institutional research activities are carried out from an IBM PC-XT which communicates with an IBM-3031 through an IRMA communications adapter. The work is done on a personal computer which acts as a terminal to the main frame. All of the work of retrieving and manipulating the data is done in a CMS environment. I find that CMS is very efficient and easy to use, and that a great deal of work can be done in a relatively short amount of time. The IRMA communications adapter also permits data and output files to be either up-loaded or down-loaded between the main frame and the PC, which adds to the efficiency with which the analyses can be conducted.

I have attended demonstrations of a number of different MIS's in the last year and have found very little that a

commercially developed MIS can do that can't be done on our system. In many instances, I have found that the system that we have developed can perform many functions that commercial systems cannot perform. In certain circumstances, commercially developed MIS's are somewhat faster at retrieving data than is our system. Under other circumstances, however, our system is faster. It has been my experience that the speed with which the data are retrieved and/or aggregated is not that critical with regard to management information. As our system is used, we continue to learn how to refine it, and to make changes in it which make it more efficient and effective. The proof of the value of our system to us lies in the fact that we seldom encounter situations in which we cannot obtain the management information which we need.

It has been approximately three years since Trinity has embarked on its developmental strategy. We monitor our progress carefully and, to date, are very pleased with our progress. We have stabilized our enrollment, made dramatic increases in the quality of our entering students, increased both the quality and quantity of our faculty, built an efficient budgeting and accounting system, built an efficient student records system, made many positive changes in the curriculum, and held a successful capital campaign. This is not to imply that we have not made some mistakes or occasionally suffered setbacks. What we attempt to do is to

monitor our activities as carefully and as often as possible so that we can continuously measure our progress.

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